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Effect Of Shoulder Strengthening Exercise On Hand Grip Strength With Atraumatic Shoulder Instability

Dr.R . Siva Anandhi(PT)[1], Dr. P. Senthil Selvam[2] , Dr.Kumarasan. A[3], Dr.P.Senthil [4] , Ms.GAYATHRI .S [5] 1.Research Scholar &Assistant Professor, School of Physiotherapy, VISTAS, Chennai -600130 2.Head &Professor, School of Physiotherapy, VISTAS, Chennai-600130. 3.Principal & HOD-Physiotherapy, Sri Narayani Hospital and Research Center, Sri Puram, Vellore - 632055. 4.Professor and Dean i/c, Department of Physiotherapy, VELS School of Physiotherapy, VELS Institute of Science Technology and Advanced Studies (VISTAS), Periyapalayam Campus, Manjankaranai Village, Uthukkottai Taluk, Tiruvallur District, Tamil Nadu – 601102 5. MPT II Year Student,School Of Physiotherapy,Vistas

ABSTRACT:

BACKGROUND:

To determine Does strength correlate with rotator cuff strength in patients with atraumatic shoulder instability.

Occupational therapy is designed to help promote and improve functional independence. Unsurprisingly, the results showed that a course of occupational therapy for people with orthopedic shoulder injuries may result in greater functional independence as well as grip strength.

METHOD:

In this study 30 patients with Atraumatic shoulder instability is taken and the patients are randomly divided in to two Group A and Group B. Group A Strengthening Exercises and Group B Pendular Exercise for 4 week.

RESULT:

The result of within Group analysis, showed extremely significant improvement in terms of pain, ROM and disability (P = 0.000) in the Group showed significant improvement compared to Pendular exercise.

CONCLUSION:

The study conclude that both Groups shows the significant improvement but Pendular exercise is more effective than Strengthening exercise.

KEYWORDS:

Quick dash quality of life, Range of motion, Hand help dynamometer hand grip strength

INTRODUCTION:

Atraumatic shoulder instability (ASI) is characterized by abnormal movement or positioning of the humerus in the glenoid people will have underlying laxity with loss of muscle control resulting in symptoms. Some experience fossa leading to recurrent pain, subluxations, dislocations and functional impairment, in the absence of a history of significant preceding injury. The true prevalence of ASI is unknown but authors report incidence rates of between 4–10%.1 most pathological laxity from repetitive micro trauma, for example when using the arm at extremes such as throwing sports. Others experience congenital hyper laxity where only a minor injury or change in demand results insymptoms[1]

The upper extremity is made up of the shoulder complex, arm, forearm, and hand, and function mobility is better when the shoulder is stable and pain-free [2] Hand grip strength has been found to correlate with the strength of other muscle groups and can therefore be used as a good predictor of overall upper body strength as well as to identify individuals who are more likely to experience physical disability. Grip strength is negatively impacted by changes in shoulder posture, health, and integrity [2]

The shoulder complex, arm, forearm, and hand make up the upper extremity, and function mobility is improved when the shoulder is secure and pain-free[3]. In order to predict overall upper body strength and to identify people who are more likely to have physical handicap, hand grip strength has been demonstrated to correlate with the strength of other muscle groups. Changes in shoulder position, health, and integrity are detrimental to grip strength [3]

According to EMG results, there was a connection between the hand grip and the activity of the shoulder muscles. The supraspinatus muscle's active flexion of the humerus increased from 60° to 120° on the EMG[4] Exercise-based physiotherapy is the mainstay of treatment, and it is used to increase muscular strength, proprioception, and muscle balance in the shoulder girdle.Patients who have not had trauma typically report with either localised shoulder hypermobility or generalised joint hyper mobility[5]

The main management strategy advised for ASI is exercise-based rehabilitation. The rehabilitation of the periscapular and rotator cuff muscles is frequently advised for ASI flexibility exercises, and functional and sports-specific training is frequently highlighted. To what extent have physiotherapists incorporated particular exercise types into their clinical practises, such as rotator cuff training, kinetic chain exercises, or exercise nl-based

protocols[6]Rotator cuff (RC)muscles (supraspinatus infraspinatus subscaoularis,and teresmirror)are considered to be the key dynamic[7]

Muscle in shoulder stabilization since they contribute significantly to shoulder stability in a number of different ways.While stabilizing the joint ,they also allow a wide range of shoulder movement throught rotational movement[7] .The shoulder joint is one of the most commonly dislocated joints

.Grip strength has been widely used in clinical practice for assessing diseases and rehabilitation progression .The handgrip is a physiology –related variable that can be affected by wide rane of factors such as age,gender,and body mass index (BMI)[7].

Several studies have investigated this relationship between grip strength and rotator cuff strength[2]. Based on this study we are going to find the effect of shoulder strengthening exercise on hand grip with atraumatic shoulder instability.where the recent research study can help identify strategies for improving hand grip thus it could help to improve the quality of life for those who suffer from this condition as well as to reduce the risk of long- term complications. thus this study shows the effectiveness of isometric exercise on shoulder strengthening program .

METHODOLOGY:

STUDY DESIGN: Comparative studies

SAMPLING METHOD: Conventional sampling

STUDY DURATION: Four weeks

STUDY SETTING: Prime clinic, Navalur, Chennai.

STUDY SIZE: 30

SAMPLE SELECTION:

INCLUSION CRITERIA

- Age group of 18 to 35 years
- Both males and females
- Unilateral shoulder pain

EXCLUSION CRITERIA

- Patients with repetitive strain
- Patient with symptoms of recurrent shoulder dislocation
- Multidirectional instability

- Patient with any neurological defect
- Neurological defecit

OUTCOME MEASURE

& TOOLS USED

OUTCOME MEASURES:

Quick Dash quality of life

Hand held dynamometer hand grip strength

Goniometer ROM (range of motion)

TOOLS USED:

- Goniometer
- Thera band
- Jamar hand dynamometer
- Dash assessment sheet

Figure 1 : Goniometer

Figure 2: Thera Band

Figure 3: Jamar Hand Dynamometer

PROCEDURE:

In this study 30 samples were taken under the0 inclusion criteria and patient's informed consent was taken. Subjects are randomly allocated in two groups (A&B) and assigned. This exercise protocol is followed for 4 days in week, 30 minutes in a day. Group A received the shoulder strengthening exercise and Group B receive the conservative management. Pre and post test measurement were taken.

DATA ANALYSIS

The collected data were tabulated and analyzed using both descriptive and inferential statistics. All the parameters were assessed using statistical package for social science (SPSS) version
24.0. Paired t-test was adopted to find the statistical difference within the groups & Independent t-test was adopted to find the statistical difference between the groups.

TABLE – 1
COMPARISON OF IR, GS AND DASH SCORE BETWEEN PRE TEST AND POST TEST WITHIN GROUP – A

GROUP – A	PRE TEST		POST TEST		t-TEST	SIGNIFICANCE
	MEAN	SD	MEAN	SD		
IR*	48.67	2.96	61.33	2.96	11.967	.000**
GS*	14.07	0.88	17.87	1.68	8.264	.000**
DASH*	78.40	5.45	65.13	4.61	12.597	.000**

(* IR – INTERNAL ROTATION, GS – GRIP STRENGTH AND DASH – DISABILITIES OF ARM SHOULDER AND HAND

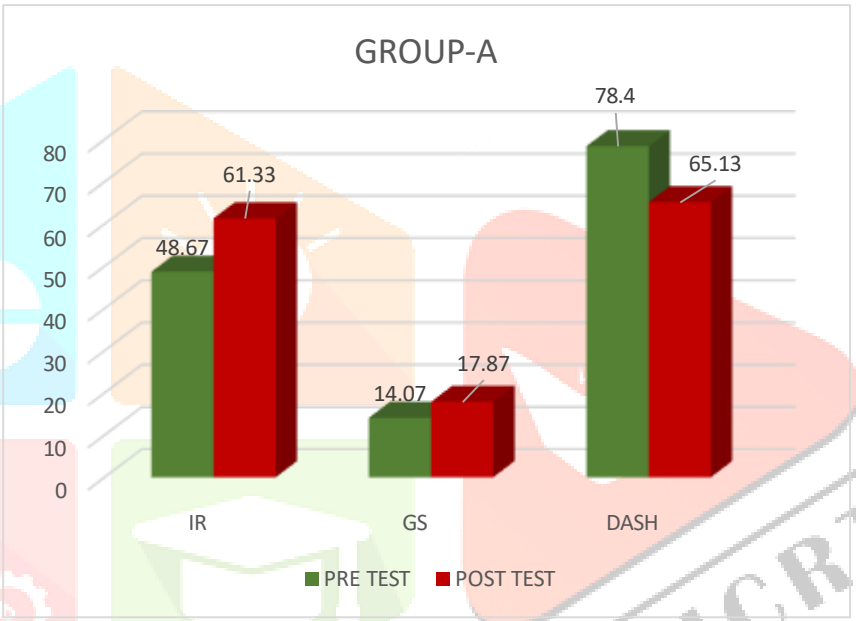
****- P ≤ 0.001)**

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group – A.

There is a statistically highly significant difference between the pre test and post test values of Internal Rotation, Grip Strength and Disabilities Of Arm Shoulder And Hand scores within Group A (***- P ≤ 0.001).

GRAPH – 1

COMPARISON OF IR, GS AND DASH SCORE BETWEEN PRE TEST AND POST TEST WITHIN GROUP – A



	MEAN	SD	MEAN	SD		
IR*	49.00	2.80	52.00	1.77	5.054	.000**
GS*	14.20	1.01	15.73	0.70	4.219	.000**
DASH*	76.80	4.52	70.67	4.35	16.300	.000**

(* IR – INTERNAL ROTATION, GS – GRIP STRENGTH AND DASH – DISABILITIES OF ARM SHOULDER AND HAND

****- P ≤ 0.001)**

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group – B.

There is a statistically highly significant difference between the pre test and post test values of Internal Rotation, Grip Strength and Disabilities Of Arm Shoulder And Hand scores within Group B (- $P \leq 0.001$).

GRAPH – 2

COMPARISON OF IR, GS AND DASH SCORE BETWEEN PRE TEST AND POST TEST WITHIN GROUP – B

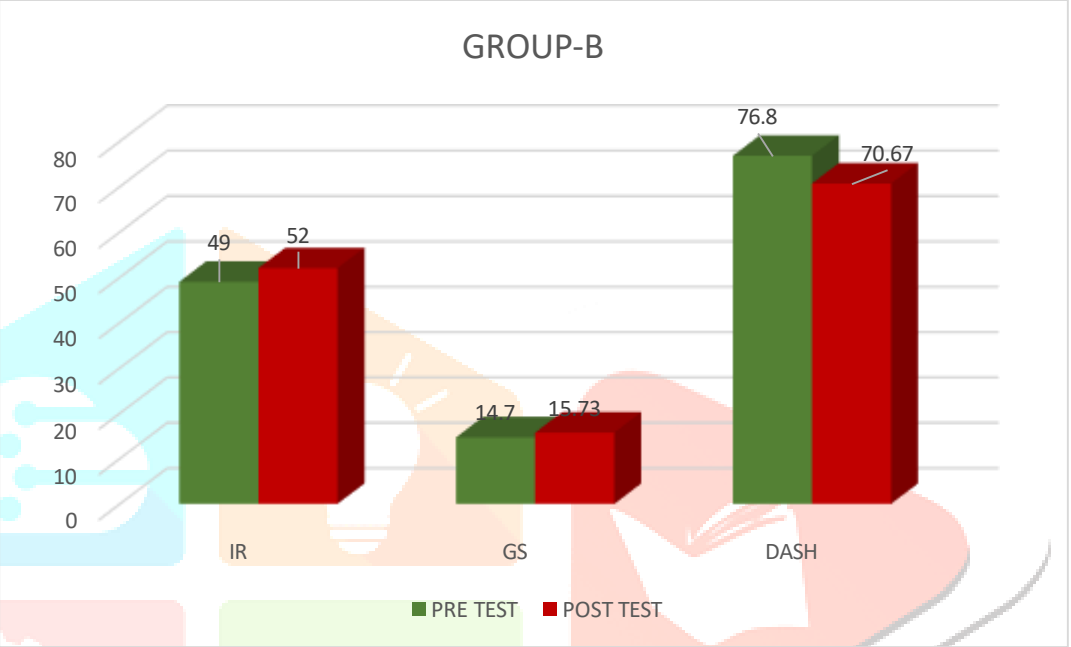


TABLE - 3

COMPARISON OF SHOULDER INTERNAL ROTATION BETWEEN GROUP – A AND GROUP – B IN PRE TEST AND POST TEST

IR	GROUP A		GROUP B		t-TEST	SIGNIFICANCE
	MEAN	SD	MEAN	SD		
PRE TEST	48.67	2.96	49.00	2.80	0.316	.754*
POST TEST	61.33	2.96	52.00	1.77	10.456	.000**

(*- P > 0.05, **- P ≤ 0.001)

The above table reveals the Mean, Standard Deviation (S.D), t-test and p-value of the Shoulder Internal Rotation Score between (Group A) & (Group B) in pre test and post test.

This table shows that there is no significant difference in pre test values of the Shoulder Internal Rotation Score between Group A& Group B (*P > 0.05).

This table shows that there is a significant difference in post test values of the Shoulder Internal Rotation Score between Group A& Group B (**P ≤ 0.001).

Both the group shows significant increase in the posttest means but (GROUP-A) which has the higher mean value is more effective than (GROUP-B).

GRAPH – 3

COMPARISON OF SHOULDER INTERNAL ROTATION BETWEEN GROUP – A AND GROUP – B IN PRE TEST AND POST TEST

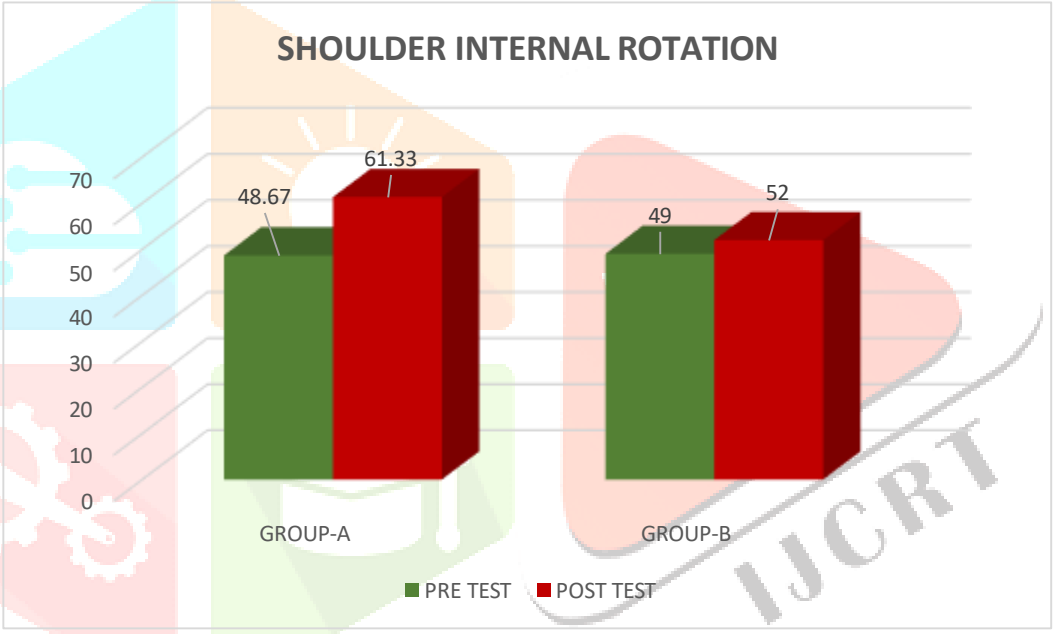


TABLE - 4

COMPARISON OF GRIP STRENGTH SCORE

BETWEEN GROUP – A AND GROUP – B IN PRE TEST AND POST TEST

GRIP STRENGTH	GROUP A		GROUP B		t-TEST	SIGNIFICANCE
	MEAN	SD	MEAN	SD		
PRE TEST	14.07	0.88	14.20	1.01	0.384	.704*
POST TEST	17.87	1.68	15.73	0.70	4.525	.000**

(*- P > 0.05, **- P ≤ 0.001)

The above table reveals the Mean, Standard Deviation (S.D), t-test and p-value of the Grip Strength Score between (Group A) & (Group B) in pre test and post test.

This table shows that there is no significant difference in pre test values of the Grip Strength Score between Group A& Group B (*P > 0.05).

This table shows that there is a significant difference in post test values of the Grip Strength Score between Group A& Group B (**P ≤ 0.001).

GRAPH – 4

COMPARISON OF GRIP STRENGTH SCORE

BETWEEN GROUP – A AND GROUP – B IN PRE TEST AND POST TEST

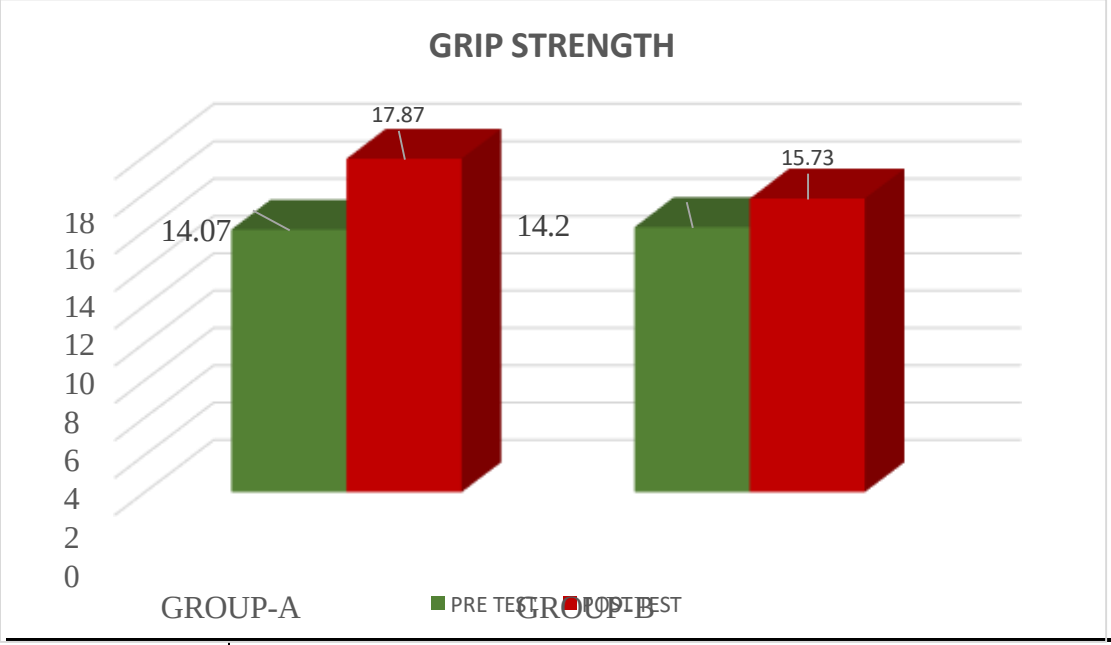


TABLE – 5

COMPARISON OF DASH SCORE BETWEEN GROUP – A AND GROUP – B IN PRE TEST ANDPOST TEST

DASH	GROUP A		GROUP B		t-TEST	SIGNIFICANCE
	MEAN	SD	MEAN	SD		
PRE TEST	78.40	5.45	76.80	4.52	0.904	.374*
POST TEST	65.13	4.61	70.67	4.35	3.379	.000**

(*- P > 0.05,- P ≤ 0.001)**

The above table reveals the Mean, Standard Deviation (S.D), t-test and p-value of the DASH score between (Group A) & (Group B) in pre test and post test.

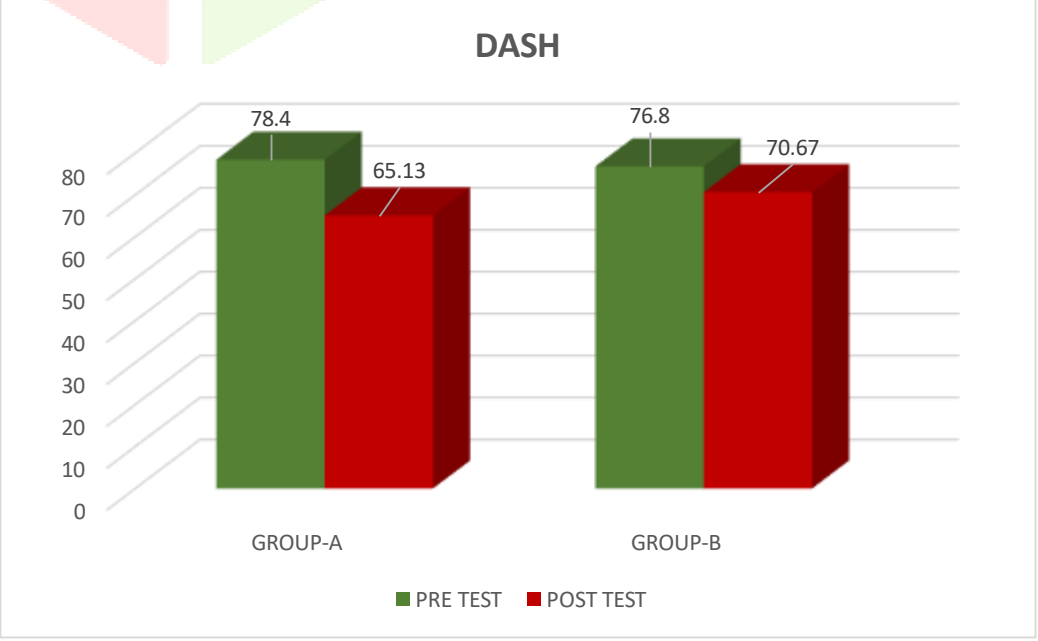
This table shows that there is no significant difference in pre test values of the DASH score between Group A & Group B (*P > 0.05).

This table shows that there is a significant difference in post test values of the DASH score between Group A & Group B (**P ≤ 0.001).

Both the group shows significant decrease in the posttest means but (GROUP-A) which has the lesser mean value is more effective than (GROUP-B).

GRAPH -5

COMPARISON OF DASH SCORE BETWEEN GROUP – A AND GROUP – B IN PRE TEST ANDPOST TEST



RESULTS:

In Table 4 & 5, On comparing Mean Values of Internal Rotation, Grip Strength and Disabilities Of Arm Shoulder And Hand scores Between pre test and post test within the Group-A and Group-B shows highly significant difference at p≤ 0.001.Hence the null hypothesis is rejected.

In Table 1, On comparing mean values of GROUP-Aand GROUP-B on Shoulder Internal Rotation shows highly significant improvement in the posttest mean but GROUP-A shows (61.33) higher mean value is more effective than GROUP-B (52.00) at P≤0.001, Hence the null hypothesis is rejected**.**

In Table 2, On comparing mean values of GROUP-A and GROUP-B on Grip Strength shows highly significant improvement in the posttest mean but GROUP-A shows (17.87) higher mean value is more effective than GROUP-B (15.73) at P≤0.001, Hence the null hypothesis is rejected.

In Table 3, On comparing mean values of GROUP-A and GROUP-B on DASH score shows highly significant improvement in the posttest mean but GROUP-A shows (65.13) lesser mean value is more effective than GROUP-B (70.67) at P≤0.001, Hence the null hypothesis is rejected.

DISCUSSION:

Atraumatic shoulder instability refers to a condition characterized by recurrent shoulder dislocation or subluxation, which occurs without any traumatic injury or event. This condition often caused by a variety of factor, including muscle weakness, ligamentous laxity and joint hypermobility Shoulder strengthening exercise are common intervention for the treatment and prevention of atraumatic shoulder instability. These exercise aim to improve the strength, stability and control of the shoulder joint, which can help reduce the frequency and severity of shoulder dislocation and subluxation

Hand grip strength is an important indicator of overall upper limb strength and function and its often used as a outcome measure in studies evaluating the effectiveness of shoulder strengthening exercise. Several studies have investigated the effect of shoulder strengthening exercise on hand grip strength in patient with atraumatic instability, with mixed results.

One study found that a six week shoulder strengthening exercise programs result in significant improvements in hand grip strength, shoulder strength, and shoulder stability in a patient in atraumatic shoulder instability. Another study found that 12 week of shoulder strengthening exercise to significant improvements in hand grip strength in patients with recurrent shoulder instability.

However, other studies have found no significant improvements in hand grip strength following shoulder strengthening exercise in patient with atraumatic shoulder instability. It is important to note that the design and duration of the exercise programs used to in this studies

valid widely, which may contribute to mixed results.

Overall, the evidence suggests that shoulder strengthening exercises may be beneficial in improving hand grip strength in patient with atraumatic shoulder instability. However, more research is needed to determine the optimal exercises program duration to achieve maximal benefit. Additionally other interventions such as manual therapy, tapping or neuromuscular re-education may be added for a more comprehensive approach.

CONCLUSION:

The present study concluded that treating shoulder strengthening exercise shown more effective result compare to hand grip strength in reducing pain and increase ROM.

LIMITATIONS OF THE STUDY:

- Small sample size.
- Study duration is short
- Study sample was limited to 18 to 35 years of age.
- Long term effects of treatments were not assessed.

RECOMMENDATIONS OF THE STUDY:

- It can be done on larger sample.
- Further study can be done with varying age group.
- Long term effect of treatment can be assessed with this treatment.

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